

Rec'd PCT/PTO

11 MAR 2005



10/5 405



INVESTOR IN PEOPLE

**PRIORITY  
DOCUMENT**SUBMITTED OR TRANSMITTED IN  
COMPLIANCE WITH RULE 17.1(a) OR (b)The Patent Office  
Concept House  
Cardiff Road  
Newport  
South Wales  
NP10 8QQ

REC'D 17 NOV 2003

WIPO

PCT

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.

Signed

Dated 30 October 2003

## Patents Form 1/77

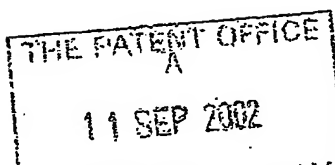
Patents Act 1977  
(Rule 15)The  
Patent  
Office

1/77

## Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

The Patent Office

Cardiff Road  
Newport  
Gwent NP9 1RH

1. Your reference

P2892-GB 01/77  
11SEP02 E747197-1 002902  
P01/7700 0.00-0220970.82. Patent application number  
(The Patent Office will fill in this part)

0220970.8

3. Full name, address and postcode of the or of each applicant (underline all surnames)

LEWIS, Thomas John  
1 Home Park  
Menheniot  
Nr Liskeard  
Cornwall  
PL14 3RW

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

7605819001

4. Title of the invention

A SELF CONTAINED MONITORING CIRCUIT

5. Name of your agent (if you have one)

K R Bryer &amp; Co

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

7 Gay Street  
Bath  
BA1 2PH

Patents ADP number (if you know it)

10777002

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number  
(if you know it)Date of filing  
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing  
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

NO

- a) any applicant named in part 3 is not an inventor; or
  - b) there is an inventor who is not named as an applicant; or
  - c) any named applicant is a corporate body.
- See note (d))

**Patents Form 1/77**

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form

Description	7
Claim(s)	2
Abstract	0
Drawing(s)	2

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translation of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)Request for preliminary examination and search (*Patents Form 9/77*) OneRequest for substantive examination (*Patents Form 10/77*)Any other documents  
(please specify)

11.

I/We request the grant of a patent on the basis of this application.

Signature

Date

11 September 2002

12. Name and daytime telephone number of person to contact in the United Kingdom

K R Bryer  
(01225) 42 88 77**Warning**

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

**Notes**

- If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.
- Write your answers in capital letters using black ink or you may type them.
- If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.
- If you have answered 'Yes' Patents Form 7/77 will need to be filed.
- Once you have filled in the form you must remember to sign and date it.
- For details of the fee and ways to pay please contact the Patent Office.

**Patents Form 1/77**

DUPLICATE

1

**A SELF CONTAINED MONITORING CIRCUIT**

The present invention relates generally to a self-contained monitoring circuit, and particularly to a device incorporating such a circuit which is capable of monitoring  
5 the continuity of supply delivered through an electrical socket.

Electrical monitoring circuits for detecting continuity of supply are known as such.

For example, the so-called "uninterruptable power supply" (UPS) devices supplied for computers operate, among other things, to detect a failure in the supply continuity,  
10 and to provide a computer with a battery-generated power supply for a limited time period during which the mains power is not available. A signal connection between the UPS and the computer triggers the computer to shut down in its normal "safe" mode. This is necessary because computers operate with electronic data which may be corrupted if the computer is merely switched off whilst operating. UPS devices  
15 are substantial in size, of significant expense, and require to be interconnected between the socket outlet of a power supply and a dedicated input of the computer. However, there are other items of equipment for which continuity of electrical supply is of significance, although not of such great significance as in the case of a computer that it is justified to provide an expensive monitoring circuit of the UPS type.

20

For example, a refrigerator or freezer requires continuity of supply in order to maintain its contents in a cool, or frozen, state and although short interruptions in the power supply may not be fatal, as they would be in the case of a computer, an extended interruption in the power supply could result in the contents of the freezer

or refrigerator warming to such an extent that they become unsafe to use and/o  
should not be re-frozen.

The present invention seeks to provide a device which is simple and economical, and  
5 which, although not providing a back up power supply in the event of failure or  
interruption, will nevertheless be capable of alerting a user to the situation so that  
appropriate remedial action can be taken promptly.

The present invention seeks to provide a device for monitoring the continuity of an  
10 electrical power supply, which is capable of producing an alarm indication (either  
audible or visual) if an unexpected or inadvertent interruption in the power supply  
should occur whereby to alert a user. This may happen, for example, because the  
incorrect switch of a bank of power supply switches has been thrown, for example in  
circumstances where a multiple socket has a number of plugs with connections  
15 leading to a number of different consumers. In a domestic environment, for example,  
a freezer, washing machine, tumble drier and other domestic electric appliance may  
all be connected to a bank of sockets having associated switches. If, intending to  
switch off the power supply to a washing machine the switch on the plug leading to  
the freezer were inadvertently thrown there would be no indication of this error until  
20 warning of the freezer contents were noted, by which time it would be too late. The  
same applies in circumstances where the incorrect plug may be withdrawn from a  
socket and, to a lesser extent, when the mains power supply fails. Usually, however,  
in such circumstances other electrical appliances such as lighting, heating and radio  
or television also cease to function providing an alert to the circumstance. Moreover,

3

in this circumstance, little, if anything, can be done to mitigate the consequences. However, the device of the present invention is operable to detect all conditions and provide an output indication if the power supply to a monitored appliance is interrupted for any reason.

5

In its broadest aspect, therefore, the present invention provides a self-contained alarm device for monitoring the supply status of a monitored electrical appliance, which device can be connected in the supply line from the mains network to the appliance itself, and is operable to provide an audible and/or visible alarm signal if the electrical power to the appliance is interrupted after connection of the device.

10

In one embodiment of the invention the alarm device is formed as an adapter having electrical pins for insertion into a socket of a mains network, and having socket connections for receiving the pins of a connector plug of the monitored appliance.

15 This embodiment is presently preferred since it can be used at different times for different appliances, is simple to implement and requires no user-input for wiring the device into the system to be monitored. Alternatively, however, the device may be incorporated into a plug for connection to the lead from the appliance. If such plugs are provided by OEM's (originally equipment manufacturers) then, again, no additional work is required by the user, although provision of plugs fitted with such circuit devices for retrofitting to equipment is possible and within the scope of the present invention.

20

Ideally the circuit device is provided with means for detecting an open-circuit

condition of a monitored supply line. This may include a delayed timer for delaying  
activation of an output device triggering the alarm indication for a pre-determined  
delay period after detection thereof. This delay period avoids the emission of  
spurious or unnecessary alarm indications if, for example, the plug is being withdrawn  
5 simply to be repositioned, or if the disconnection by throwing the switch is temporary.  
The delay period may be anything from a few seconds to a few minutes, and may be  
adjustable to allow adaptation of the device to different appliances having different  
requirement. A delay of an hour or more may be appropriate in some circumstances  
where a delay of a few seconds is sufficient in others.

10

Solid state components can be produced in miniaturised form sufficient to enable the  
device to be fitted into the space available within an electrical plug of conventional  
dimensions. Electro-mechanical devices may also be incorporated and, for example,  
the output device in particular may be a relay. The self-contained alarm device may  
15 incorporate a capacitor which is maintained charged when the supply is present and  
which discharges when the supply is removed, whereby to provide a sensing signal  
detectable by an appropriate detection circuit and usable as the parameter to indicate  
the interruption of the power supply.

20 The open circuit condition may be detected, for example, by sensing a reversal in the  
polarity of a voltage differential across a resistive element.

Various embodiments of the invention will now be more particularly described, by  
way of example, with reference to the accompanying drawings, in which:

Figure 1 is a schematic view of electrical appliances connected to the mains supply via monitoring devices formed as embodiments of the present invention;

Figure 2 is a schematic exploded view of an embodiment of the present invention positioned between an electrical socket outlet and a connector plug for an appliance; and

Figure 3 is a schematic circuit diagram of some components of a device formed in accordance with the principles of the present invention.

Turning now to the drawings, Figure 1 illustrates a typical situation in which the monitoring device of the present invention may be utilised. Here, a washing machine generally indicated 11 and a domestic freezer generally indicated 12 are connected by respective leads 13,14 to a double outlet socket 15 having respective rocker switches 16, 17 for controlling connection and disconnection of the power supply from a mains network (not illustrated) to respective socket outlets on either side of the switches.

The washing machine 11 is shown connected to the socket outlet 15 by a plug 18, and the freezer is shown connected to the socket outlet 15 by a plug 19 via the interception of a monitoring device 20 having a visible indicator lamp 21 and an audible alarm outlet (microphone or buzzer) 22.

As can be seen in Figure 2, a live pin 23 of the monitoring circuit 20 connects directly to a live pin 24 of the plug 18 which is electrically connected via the load, in this case a freezer 12, to the neutral pin 25 of the plug 19. A sensing circuit 26 of the device 20 is connected between the neutral socket 29 and a neutral pin 27. The sensing circuit 26 is illustrated in more detail in Figure 3. It incorporates a battery 30,



6

typically a nine volt battery, the positive terminal of which is connected to the battery supply rail 31 and the negative terminal of which is connected to ground. The battery supply rail 31 is connected via a resistor 32 and series-connected capacitor 33 to ground and, via a parallel resistor 34 to a balance input 35 of a timer circuit 36 the other input 37 of which is connected via a line 38 to a node 39 between the sensing resistor 32 and capacitor 33.

The timing circuit 36 is powered from the battery supply rail 31 via a line 40 and has an output line 41 leading to a relay coil 42 the other end of which is grounded. The relay contacts 43 are likewise grounded and the central contact 44 is connected via a line 45 to an audible indicator device 46 supplied from the supply rail 31. A protection diode 42 is connected in a forward direction between ground and the output line 41. A relay coil 50 is connected in series between the socket 19 and the pair 27. Its associated relay contacts 48 are connected between the node 39 and ground.

Finally, a test switch 47 is connected between the node 39 and ground.

When the device 20 is plugged into a socket outlet and a plug 19 is plugged into the device 20 and the main switch 17 thrown to energise the appliance 12 the relay 50 is energised and the contacts 48 open allowing the capacitor 33 to charge. The timer circuit 36 is balanced in these circumstances and the output on line 41 is therefore at ground or, at any rate, a low level such as not to energise the relay coil 42. The movable contact 44 of this relay engages the "open circuit" contact of the contact pair 43 so that no current can flow through the audible indicator 46. If it is desired to test

the operation of the circuit the switch 47 is depressed grounding the node 39. The capacitor 43 then discharges rapidly causing a fall in the voltage at the input 37 of the timer 36. This unbalanced situation is detected to cause a positive output on line 41 triggering the relay coil 42 and causing the centre contact 44 to switch to the earthed  
5 contact thereby creating a path thorough the audible indicator 46 from the supply rail 31 and through the connecting line 45. The audible indicator thus provides an output sound which, upon release of the switch 47, ceases as the capacitor 33 recharges and the voltage level at input 37 rise to its original value.

10 If, instead of the test switch 47, the switch 17 is thrown to cause voltage to the appliance to fail, the relay contacts 48 close resulting in a similar operation to that of the test button 47, giving an audible alarm to indicate the failure condition and alert the user to the inadvertent (or deliberate) disconnection of the monitored appliance.

15 As will be seen from Figure 2, the circuit 26 will detect an interruption if the plug 19 is withdrawn from the socket connectors 28, 29 of the device 20, or if the device 20 itself is withdrawn from the supply outlet as well as switching of the circuit via the switch 17. Likewise, failure of the power supply entirely will also produce the same result.

20

## CLAIMS

1. A self-contained alarm device for monitoring the supply status of a monitored electrical appliance for connection in the supply line from the network for the  
5 appliance, operable to provide an audible and/or visible alarm signal if the electrical power to the appliance is interrupted after connection.
2. A self-contained alarm service according to Claim 1, formed as an adapter with  
10 pin for insertion into a socket and having socket connections for receiving the pins of a connector plug of the monitored appliance.
3. A self-contained alarm device according to Claim 1 or Claim 2, in which there are provided means for detecting an open-circuit condition of a monitored supply line.
- 15 4. A self-contained alarm device according to any of Claims 1 to 3, including a delay timer for delaying operation of an output device triggering the alarm indication for a pre-determined delay period after detection thereof.
5. A self-contained alarm device according to Claim 4, in which the said output  
20 device is a relay.
6. A self-contained alarm device as claimed in any preceding claim, having a capacitor which is maintained charged when the supply is present and which discharges when the supply is removed to provide the sensing signal.

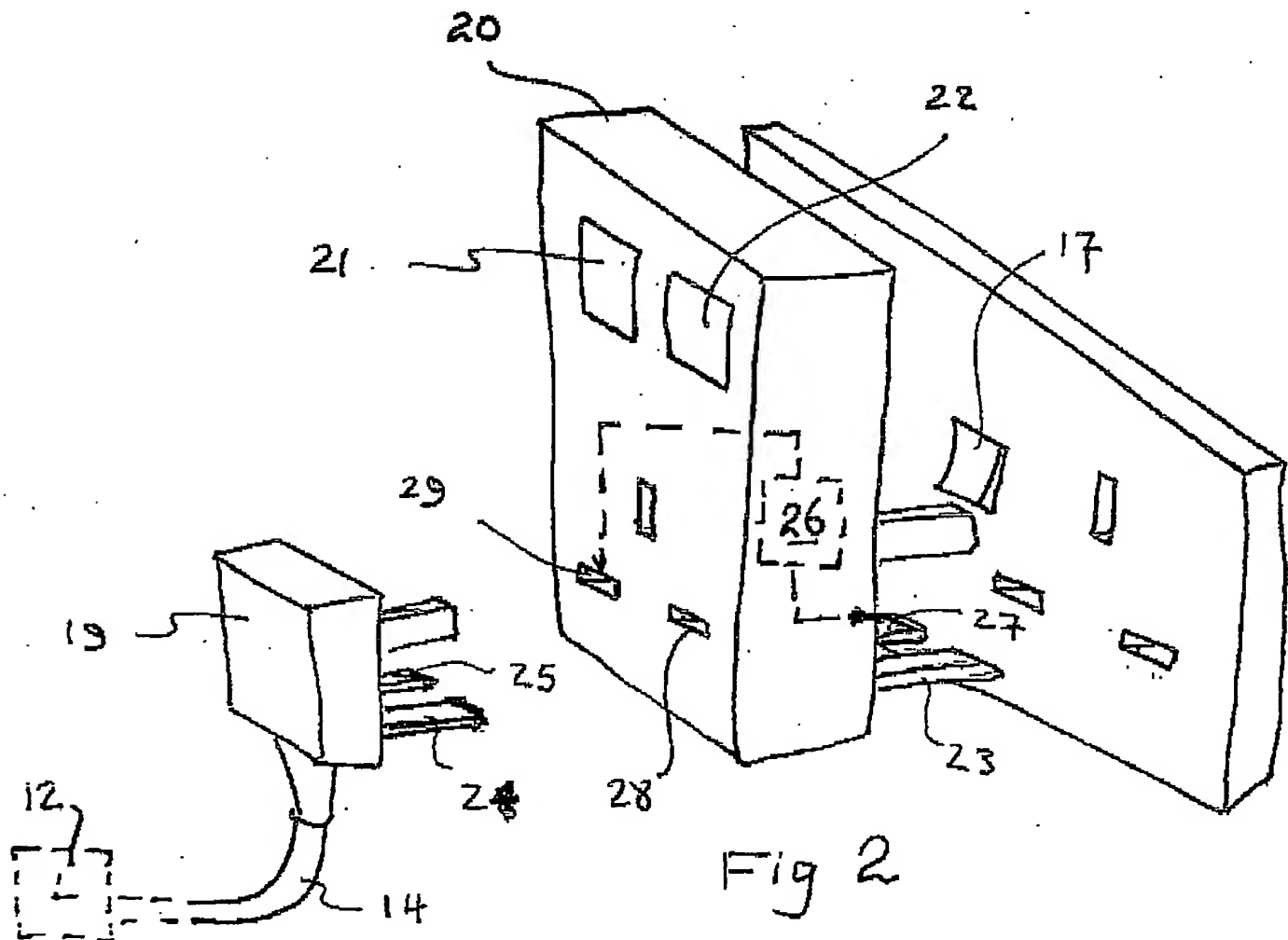
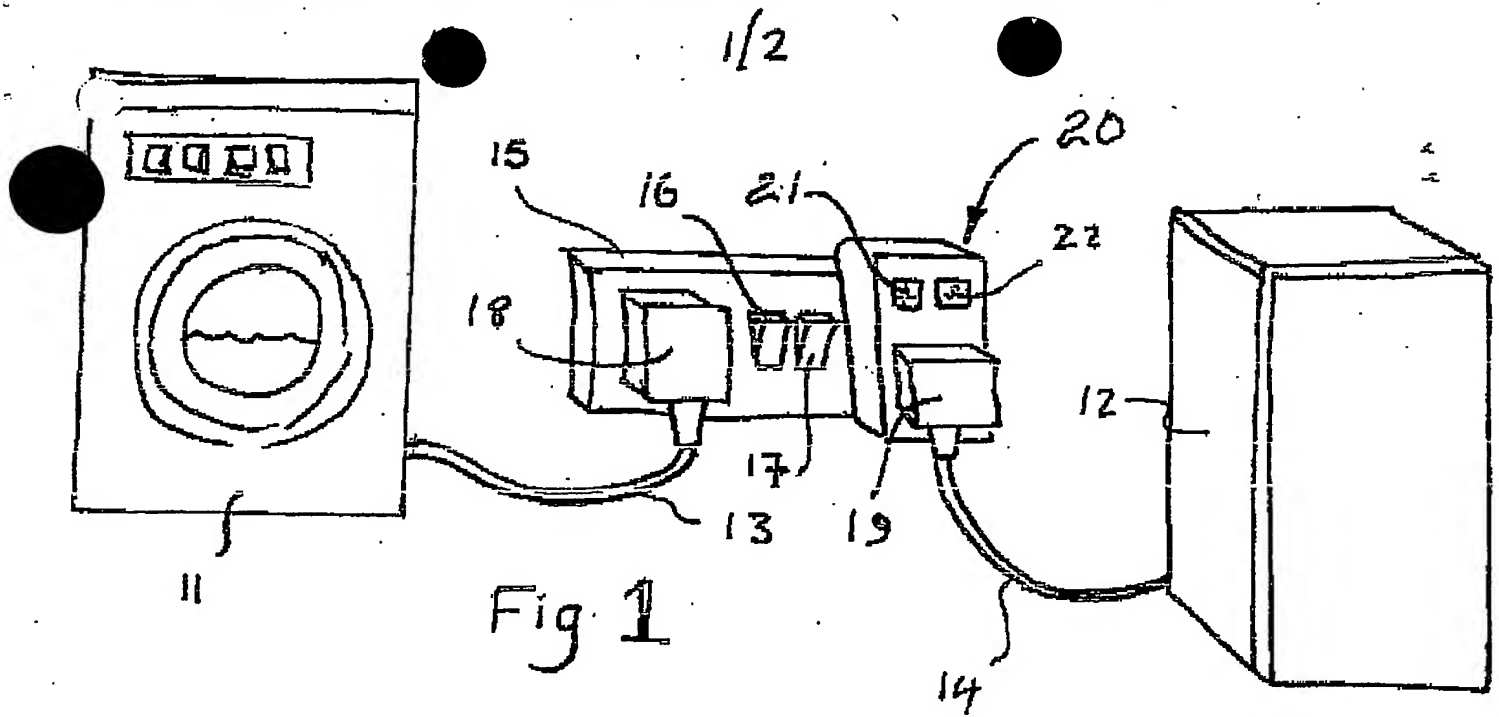
BEST AVAILABLE COPY

9

7. A self-contained alarm device as claimed in any preceding claim, in which the open circuit condition is detected by sensing a reversal in the polarity of a voltage differential across a resistance element.

5

8. A self-contained alarm device substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.



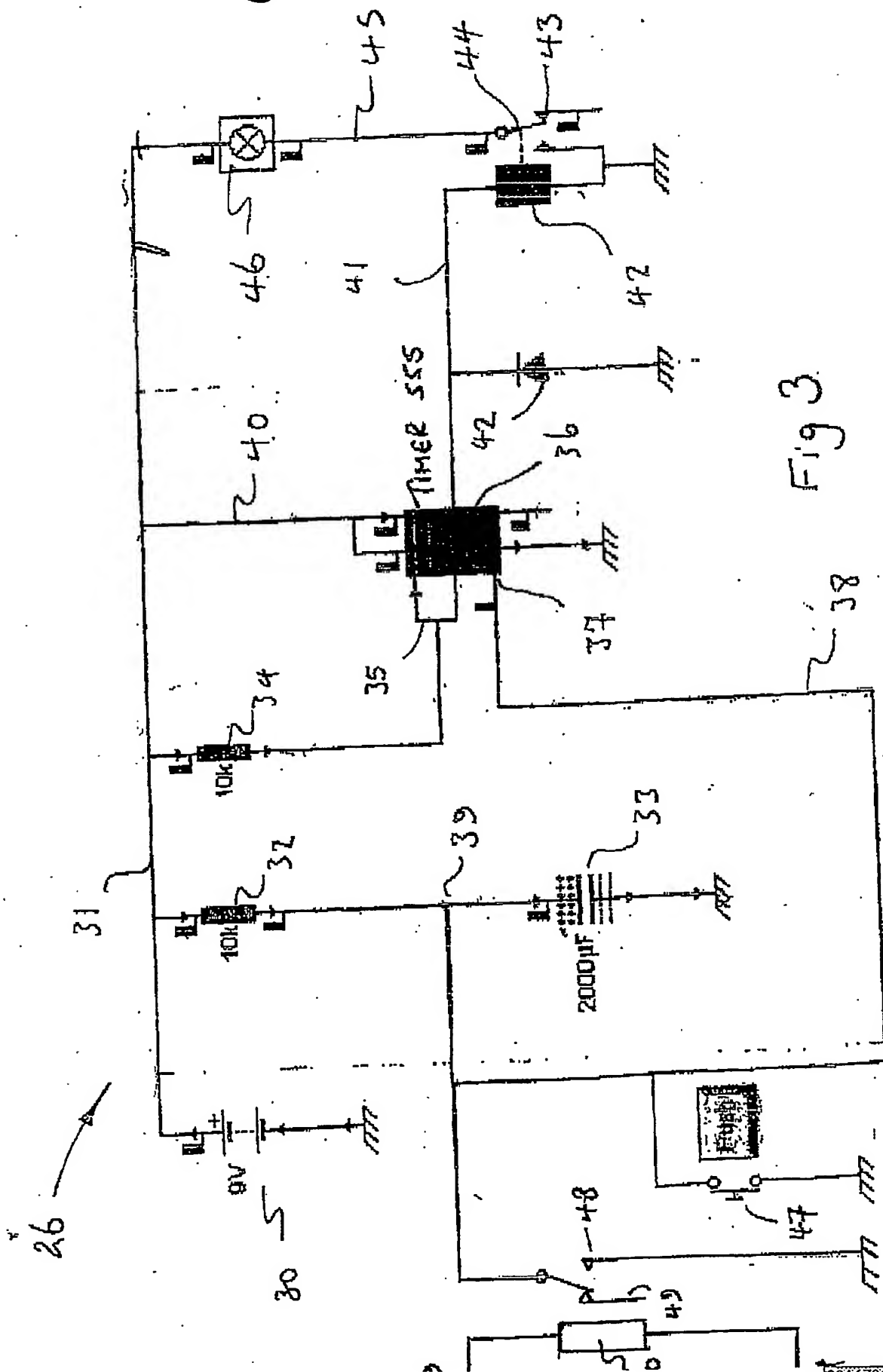


Fig 3

PCT Application  
**GB0303956**



**BEST AVAILABLE COPY**